

A new species of the genus *Petrolisthes* Stimpson, 1858 (Crustacea: Decapoda: Anomura: Porcellanidae) from Yonaguni Island, the Ryukyu Islands

Masayuki Osawa

Department of Aquatic Biosciences, Tokyo University of Fisheries,
4-5-7, Konan, Minato-Ku, Tokyo 108, Japan

Abstract.—A new species of the genus *Petrolisthes* Stimpson, 1858, *P. donanensis*, is described and illustrated on the basis of two specimens collected from Yonaguni Island, the Ryukyu Islands. This species closely resembles *P. decacanthus* Ortmann, 1897, but is distinguishable from the latter species by the following characters: sinuously triangular rostrum; absence of hepatic spines; antennular peduncles with basal segment unarmed on anterior margin except for a strong spine on lateral corner; chelipeds with palm bearing a small spine at subdistal corner of dorsoflexor margin; and ambulatory legs with slender propodi, and dactyli bearing four flexor spines.

The porcellanid crab genus *Petrolisthes* Stimpson, 1858, includes numerous intertidal or subtidal species. Eighteen species have been reported from the Ryukyu Islands, southwestern Japan (Miyake 1982, Kropp 1986, Osawa 1996), some of which are conspicuous on the intertidal boulder beaches of the islands (Asakura 1991).

Through the courtesy of Mr. K. Nomura of the Kushimoto Marine Park and Dr. T. Komai of the Natural History Museum and Institute, Chiba, I had the opportunity to examine two porcellanid crabs collected from the intertidal zone of Yonaguni Island (24°27'N, 122°56'E), the westernmost of the Ryukyus chain. The examination revealed that the two specimens belong to an undescribed species of the genus *Petrolisthes*. This new species is herein described and illustrated.

The carapace length (CL) and width (CW), as indications of specimen size, were measured, CL from the anterior tip of the rostrum to the median posterior end of the carapace, and CW at the broadest part. Measurements of ambulatory legs were made as follows: lengths of carpus and

propodus along extensor margin, and height of propodus at midline. The type specimens are deposited in the Natural History Museum and Institute, Chiba (CBM).

Petrolisthes donanensis, new species
Figs. 1, 2

Type material.—Holotype: ovig. female (CL 8.6 mm, CW 8.9 mm), Yonaguni Island, Ryukyu Islands, intertidal, 15 Apr 1995; CBM-ZC 2147. Paratype: 1 female (CL 5.9 mm, CW 5.9 mm), same data as holotype; CBM-ZC 2148.

Description.—Carapace (Fig. 1A, B) weakly convex dorsally, slightly broader than long or as long as broad, broadest on posterior branchial regions. Branchial margins strongly convex, with longitudinal tuberculated edges, posterior branchial margins with strong transverse rugae. Rostrum (Fig. 1C) moderately broad, slightly bent ventrally, sinuously triangular; median lobe strongly produced; dorsal surface with numerous small, flattened tubercles. Protogastric ridges distinct, divided into 2 lobes by median groove extending to tip of rostrum. Orbits (Fig. 1G) deep; orbital margin armed

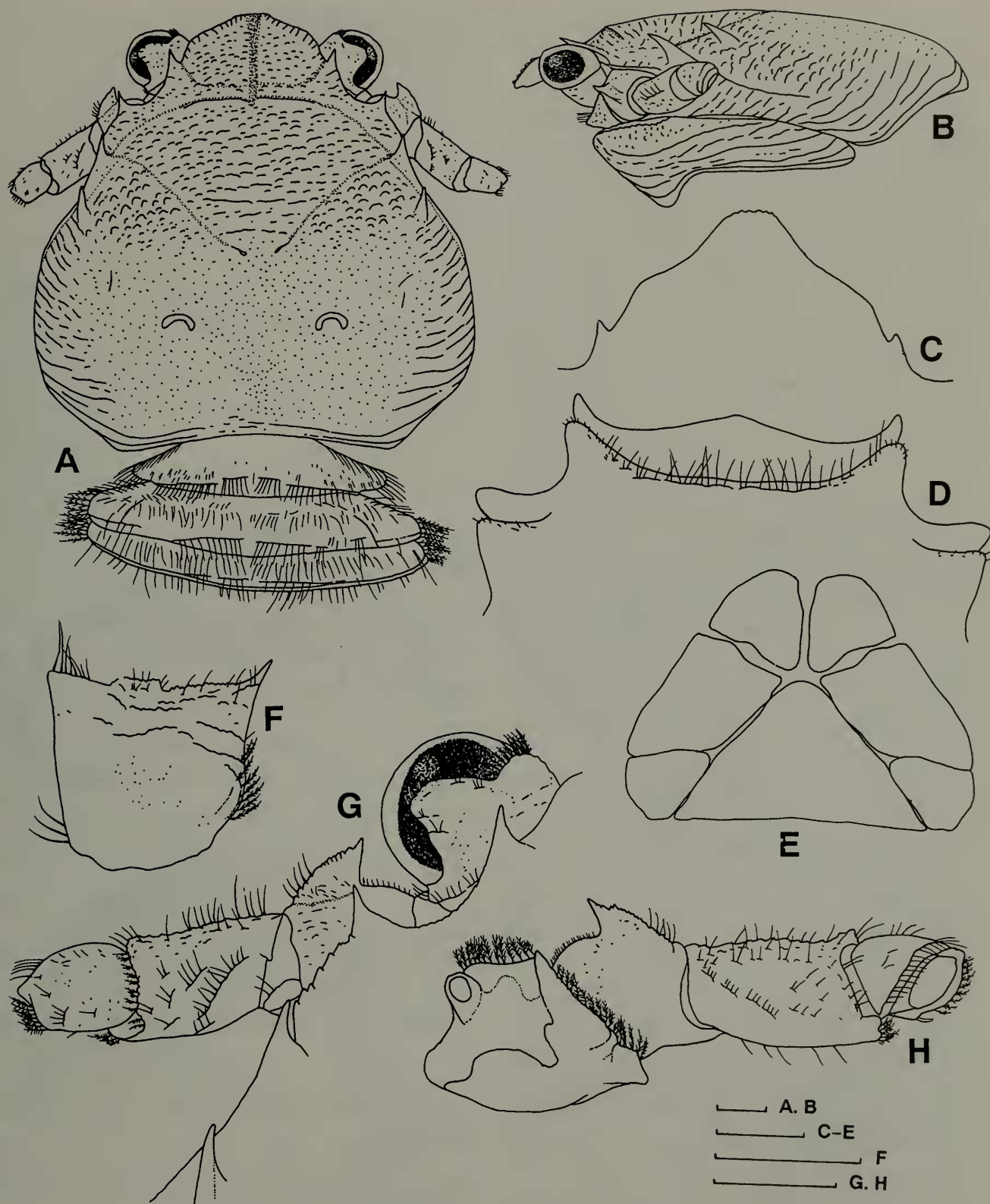


Fig. 1. *Petrolisthes donanensis*, new species. Holotype, ovigerous female (CL 8.6 mm, CW 8.9 mm; CBM-ZC 2147). A, carapace and proximal somites of abdomen, dorsal; B, carapace and pterygostomial flap, lateral; C, rostrum, frontal; D, thoracic sternites, ventral; E, telson, exposed; F, left basal segment of antennular peduncle, ventral; G, left eye and antennal peduncle, dorsal; H, left antennal peduncle, ventral. Scales equal 1.0 mm.

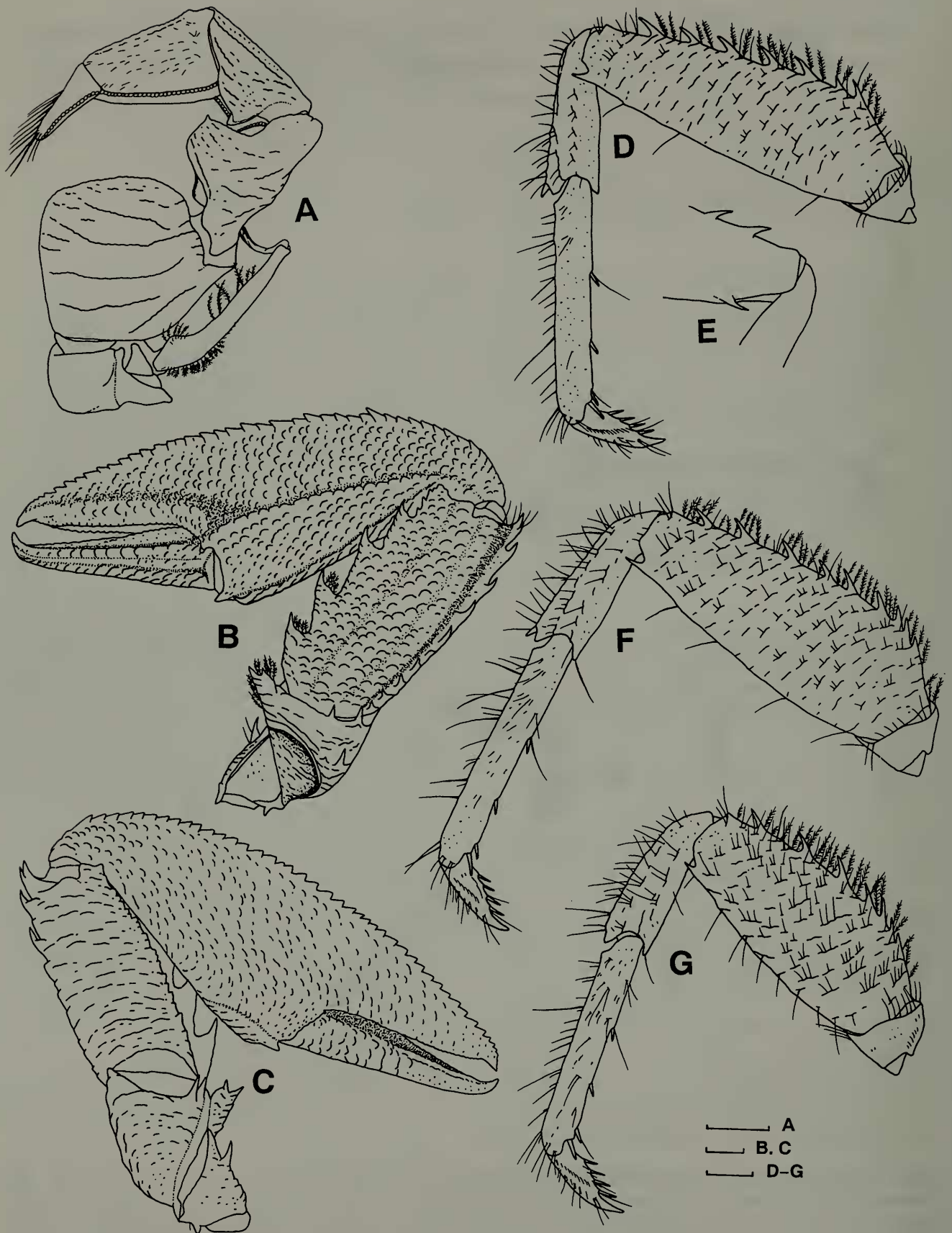


Fig. 2. *Petrolisthes donanensis*, new species. Holotype, ovigerous female (CL 8.6 mm, CW 8.9 mm; CBM-ZC 2147). A, left third maxilliped, long setae omitted on flexor margin, ventral; B, right cheliped, dorsal; C, same, ventral; D, left first ambulatory leg, lateral; E, same, distal part of merus, mesial; F, left second ambulatory leg, lateral; G, left third ambulatory leg, lateral. Scales equal 1.0 mm.

with well developed supraocular spine; outer orbital angle produced into strong, acute spine. Gastric region with numerous flattened tubercles and short, transverse rugae; metagastric region with rugae longer and more distinct. Hepatic margins tuberculate, lacking spines. Cervical grooves moderately marked. Two epibranchial spines well developed on each side. Anterior branchial regions with weakly developed tubercles. Posterior branchial and cardiac regions covered with short plumose or simple setae. Rugae and flattened tubercles on carapace fringed with short plumose or simple setae anteriorly.

Pterygostomian flaps (Fig. 1B) provided with longitudinal ridges, anterodorsal margin fringed with small tubercles.

Third thoracic sternite (Fig. 1D) strongly depressed, trilobate anteriorly; median lobe not exceeding laterals, with broadly rounded apex. Fourth sternite provided with series of short rugae along concave, anterior margin.

Telson (Fig. 1E) as illustrated.

Ocular peduncles (Fig. 1G) moderately large, short, with several short striae on dorsal surface; dorsal extension onto cornea rounded; anterodistal margin fringed with short plumose setae.

Basal segment of antennular peduncles (Fig. 1F) transversely rugose on anterior region of ventral surface; anterior margin weakly produced, tuberculate, with strong, acute spine laterally.

Antennal peduncles (Fig. 1G, H) 4-segmented; first segment immovable, following segments movable. First segment not strongly produced forward in lateral view, with small projection anterodistally. Second segment armed anteriorly with triangular crest bearing small tuberculate spine at proximal end, dorsal and ventral surfaces relatively smooth. Third segment rectangular, anterior margin minutely crenulate, dorsal and ventral surfaces with oblique rugae. Fourth segment smooth.

Third maxillipeds (Fig. 2A) robust. Ischium broad, ovate, transversely rugose on

ventral surface. Merus provided with laminate and subrectangular lobe with small tuberculate spine on ventroflexor margin, transversely rugose on ventral surface. Carpus with distinct projection on subproximal region of flexor margin, and longitudinal rugae on ventral surface, one of those rugae along ventroextensor margin forming ridge. Propodus with scattered short setae on ventral surface, and longitudinal striae along extensor margin. Dactyl subtriangular, ventral surface smooth. Exopod laminate, slender, inflated proximally, with distal flagellum. Rugae on ventral surface of ischium to carpus fringed with short plumose setae on anterior sides.

Chelipeds (Fig. 2B, C) subequal (left cheliped missing in holotype). Ischium armed with strong, acute spine near distal end of ventroflexor margin. Merus short; dorsal surface transversely rugose, with distinct transverse ridge submedially, and 1 median spine near extensor margin; dorsoflexor margin provided with crenulate lobe with 1 or 2 small spines at distal end; dorso-distal margin armed with 2 spines; ventral surface rugose, distoflexor margin with 2 spines. Carpus (excluding flexor marginal teeth) 2.3 times as long as broad; dorsal surface with numerous small, flattened or weakly developed tubercles, median, longitudinal, weak ridge (composed of series of squamae in paratype) and shallow sulcus along extensor margin; dorsoflexor margin armed with 4 strong acute teeth serrated or crenulate along edges; dorsoextensor margin provided with 8–10 spines along entire length, distal spine with double-pointed apices; ventral surface transversely rugose, flexor margin crenulate. Palm with extensor margin thin, weakly arched and serrated; dorsal surface with distinct, median, longitudinal ridge extending from proximal end of palm to base of dactyl, and composed of series of flattened, squamose tubercles; surface between flexor margin and longitudinal ridge with numerous small, flattened tubercles; surface between extensor margin and longitudinal ridge with numerous small,

flattened or weakly to moderately developed tubercles; dorsoflexor margin with longitudinal rugose ridge and 1 small but distinct spine at subdistal corner; ventral surface with numerous short, oblique rugae. Fixed finger with numerous small, weakly developed tubercles on dorsal surface; ventral surface rugose as in palm. Dactyl with dorsal surface armed with longitudinal ridge of flattened and imbricated tubercles along midline, and rugose ridge along flexor margin; ventral surface with small, flattened tubercles. Rugae and tubercles on dorsal surface of merus to dactyl fringed with short plumose setae arising from distal sides.

Ambulatory legs (Fig. 2D–G) relatively slender. Merus elongate, narrowing distally; extensor margin serrate, number of spines 5–7 in first, 7–9 in second, and 5–7 in third legs, and furnished with short, plumose or simple setae; lateral surface with numerous short, transverse rugae; distoflexor margin armed with 1 acute spine (lacking on third leg of paratype); flexor margin on mesial surface provided with 1 strong spine subdistally. Carpus relatively long, with short, longitudinal rugae furnished with simple, short and long setae on lateral surface; subdistoextensor angles of first and second legs armed with 1 spine (lacking on second leg of paratype), unarmed on third leg. Propodus slender, long, approximately 1.4 times as long as carpus and 6.6–7.1 times as long as high; lateral surface and extensor margin with scattering, simple, short and long setae; flexor margin armed with 2 or 3 movable spines in addition to distal pair. Dactyl terminating in slightly curved claw, flexor margin with 4 movable spines.

Color (preserved in ethanol).—Carapace, chelipeds, and ambulatory legs dark or light reddish except for following parts of ambulatory legs: distal part of merus, proximal and distal parts of carpus and propodus (whitish), and dactyl (whitish but dark brown in distal claw).

Distribution.—So far known only from

the type locality, Yonaguni Island, the westernmost of the Ryukyus; intertidal.

Etymology.—This specific name is derived from “Donan,” which means Yonaguni Island in the Ryukyu dialect.

Remarks.—Haig & Kropp (1988) described *Petrolisthes eldredgei*, and redescribed two poorly known species, *P. decacanthus* Ortmann, 1897 and *P. bispinosus* Borradaile, 1900, all from the Indo-West Pacific. They mentioned that the three species stand out as a group quite distinct from other Indo-West Pacific congeners by the sharing of the following characters: transversely rugose carapace; presence of two pairs of the epibranchial spines; unarmed mesobranchial margins; and merus of the first ambulatory leg with a strong subdistal spine on the mesial flexor margin. These four characteristics are also found in the present new species, therefore, *P. donanensis* can be considered the fourth member of this group.

Petrolisthes donanensis most closely resembles *P. decacanthus*. These two species share the following characters: orbital angles produced into a strong spine; presence of a pair of supraocular spines; and chelipeds with carpus and palm covered with numerous imbricated tubercles and granules on the dorsal surface. The second feature also distinguishes the two species from *P. bispinosus* and *P. eldredgei*. In addition to these characters, the spine on the ventroflexor margin of the ischium of the chelipeds found in *P. donanensis*, which has not been described previously for any species of *Petrolisthes*, was also confirmed in specimens of *P. decacanthus* from Guam (R. K. Kropp, pers. comm.), and in the figure of this species by Haig & Kropp (1988: fig. 3e), although the spine was rather weak. *Petrolisthes donanensis*, however, differs from *P. decacanthus* in: the sinuously triangular rostrum (trilobate in *P. decacanthus*); absence of hepatic spines; antennular peduncles with basal segment unarmed on the anterior margin except for a strong spine at the lateral corner (with several

strong spines and denticles in *P. decacanthus*); chelipeds with palm bearing a small spine at the subdistal corner of the dorsoflexor margin; and ambulatory legs with slenderer propodi and dactyli bearing four flexor spines (three spines in *P. decacanthus*).

The presence of a pair of supraocular spines and two pairs of epibranchial spines in *P. donanensis* and *P. decacanthus*, also links these to several Indo-West Pacific species such as *P. scabriculus* (Dana, 1852), *P. militaris* (Heller, 1862), *P. perdecorus* Haig, 1981, and *P. heterochrous* Kropp, 1986. Based on the examination of material of *P. militaris* from the Ryukyus and Indonesia, the species has been found to possess a strong subdistal spine on the mesial flexor margin of the merus of the first ambulatory leg, as well as *P. bispinosus*, *P. eldredgei*, *P. decacanthus*, and *P. donanensis*.

A key to the Indo-west Pacific species with a pair of supraocular spines and two pairs of epibranchial spines is provided below.

1. Branchial margins of carapace armed with spines 2
- Branchial margins of carapace unarmed 5
2. Orbits deep. Dorsal surface of carapace with dense, short pubescence and scattered, long setae *P. perdecorus*
- Orbits rather shallow 3
3. Inner orbital angles produced into small spine *P. scabriculus*
- Inner orbital angles unarmed 4
4. Rostrum trilobate *P. heterochrous*
- Rostrum sinuously triangular *P. militaris*
5. Rostrum trilobate *P. decacanthus*
- Rostrum sinuously triangular
- *P. donanensis*, new species

Acknowledgments

I express my sincere appreciation to Mr. K. Nomura of the Kushimoto Marine Park and Dr. T. Komai of the Natural History Museum and Institute, Chiba, for giving me the opportunity to examine this interesting

material. My deep gratitude is due to Dr. M. Murano of the Shin-Nippon Meteorological and Oceanographical Consultant Co. Ltd., Dr. R. K. Kropp of the Battelle Ocean Sciences, Dr. V. Wadley of the CSIRO Division of Fisheries, and Dr. R. Lemaitre of the National Museum of Natural History, Smithsonian Institution, for critical reviewing the manuscript and offering many helpful comments.

Literature Cited

- Asakura, A. 1991. Differences in the patterns of distribution of the porcelain crab, *Petrolisthes japonicus* on an oceanic island (Chichijima, Ogasawara) and on a continental island (Zamami, Okinawa).—*Researches on Crustacea* 20:23–28.
- Borradaile, L. A. 1900. On the Stomatopoda and Macrura brought by Dr. Willey from the South Seas. Pp. 395–428 in A. Willey, ed., *Zoological results based on material from New Britain, New Guinea, Loyalty Islands and elsewhere, collected during the years 1895, 1896 and 1897. Part IV*, University Press, Cambridge.
- Dana, J. D. 1852. *Crustacea*, Part 1.—United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N. 13:1–685. (Sherman, Philadelphia.)
- Haig, J. 1981. Three new species of *Petrolisthes* (Decapoda, Anomura, Porcellanidae) from the Indo-West Pacific.—*Journal of Crustacean Biology* 1:265–271.
- , & R. K. Kropp. 1988. *Petrolisthes eldredgei*, a new porcellanid crab from the Indo-West Pacific, with redescription of two related species.—*Micronesia* 20:171–186. [Issue dated December 1987.]
- Heller, C. 1862. Neue Crustaceen gesammelt während der Weltumseglung der K. K. Fregatte "Novara." Zweiter vorläufiger Bericht.—*Verhandlungen der kaiserlich-königlichen Zoologisch-Botanischen Gesellschaft in Wien* 28:519–528.
- Kropp, R. K. 1986. A neotype designation for *Petrolisthes tomentosus* (Dana), and description of *Petrolisthes heterochrous*, new species, from the Mariana Islands (Anomura: Porcellanidae).—*Proceedings of the Biological Society of Washington* 99:452–463.
- Miyake, S. 1982. Japanese crustacean decapods and stomatopods in color. I. Macrura, Anomura and Stomatopoda. Hoikusha Publishing Co., Osaka, 261 pp.

- Ortmann, A. E. 1897. Carcinologische Studien.—*Zoologische Jahrbücher. Abtheilung für Systematik, Geographie und Biologie der Thiere* 10: 258–372.
- Osawa, M. 1996. Two new species of the genus *Petrolisthes* (Decapoda: Anomura: Porcellanidae) from the Indo-West Pacific.—*Journal of Crustacean Biology* 16:602–612.
- Stimpson, W. 1858. *Prodromus descriptionis animalium evertibratorum, quae in expeditione ad oceanum pacificum septentrionalem, a republica federata missa, Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Pars VII. Crustacea Anomoura.*—*Proceedings of the Academy of Natural Sciences of Philadelphia* 10:225–252.